

DOCKET NO: 264737US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
ANDREAS WOELFERT, ET AL. : EXAMINER: CHO, J. Y.
SERIAL NO: 10/523,919 :
FILED: FEBRUARY 7, 2005 : GROUP ART UNIT: 1621
FOR: MODERATE-PRESSURE GAS :
PHASE PHOSGENATION

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal of the Final Rejection dated April 15, 2008 of Claims 1-6. A Notice of Appeal is **submitted herewith**.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is BASF SE, having an address at 67056 Ludwigshafen, Germany.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals, interferences, or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 1-6 stand rejected and are herein appealed. Claims 7-8 stand withdrawn from consideration.

IV. STATUS OF THE AMENDMENTS

No amendment under 37 CFR 1.116 has been filed.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

A summary of the claimed subject matter, as claimed in sole independent Claim 1, is mapped out below, with reference to page and line numbers in the specification added in **[bold]** after each element.

The claimed subject matter is a process for preparing aromatic diisocyanate **[page 2, lines 7-8]** by reacting a phosgene with a diamine in the gas phase, **[page 2, lines 8-9]** wherein the reaction is carried out in a reaction zone in which the pressure is more than 3 bar and less than 20 bar **[page 2, lines 9-11]** and the temperature in the reaction zone is from more than 200°C to less than 600°C. **[page 4, lines 38-39]**

VI. GROUNDS OF REJECTION

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as unpatentable over US 4,581,174 (Ohlinger et al).

VII. ARGUMENT

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ohlinger et al. The rejection is untenable and should not be sustained.

As recited in Claim 1, an embodiment of the present invention is a process for preparing **aromatic diisocyanate** by reacting a phosgene with a diamine **in the gas phase**, wherein the reaction is carried out in a reaction zone in which the pressure is more than 3 bar and less than 20 bar and the temperature in the reaction zone is from more than 200°C to less than 600°C. (Emphasis added).

Ohlinger et al is drawn to a process for the continuous preparation of organic isocyanates through the reaction of organic amines with phosgene in the presence of organic solvents under pressure and at elevated temperatures, wherein the hydrogen chloride content in the reaction mixture prior to the addition of the amine is less than 0.5% by weight and wherein the molar ratio of phosgene to NH₂ group in the organic amines is from 12:1 to 200:1 (column 2, lines 52-63). More importantly, it is clear that Ohlinger et al's process is carried out **in the liquid phase**, in view of the above-discussed disclosure in Ohlinger et al of preparing the organic isocyanates in the presence of organic solvents, and the disclosure that suitable inert organic solvents or compounds in which the amines and phosgene are at least partially soluble (column 4, lines 22-24), that the amines may be used undiluted or as solutions in organic solvents (column 4, lines 41-42), of amine feed solution (column 6, line 1), the combined liquid streams (column 6, lines 12-13), as well as the examples (column 8, line 14ff).

Compared to phosgenation in the liquid phase, gas phase phosgenation, among other advantages, has the big advantage of a reduced phosgene holdup, due to better mixability of the gases compared to liquids, and the resulting smaller reaction zone. While Ohlinger et al acknowledge that it is known to manufacture isocyanates from primary amines and phosgene in either the gas or liquid phase, depending on the nature of the amines (column 1, lines 11-15), it would not have been obvious to modify Ohlinger et al's process to be conducted in the

gas phase, absent Applicants' disclosure, since the various characteristics of Ohlinger et al's process, such as its use of organic solvents, temperature, recycle loop, etc., are tied to a liquid phase process.

In the Final Rejection, in response to Applicants' arguments, the Examiner holds that it would have been obvious to carry out the recited reaction in the gas phase, notwithstanding that Ohlinger et al's invention is a liquid phase reaction, since the reaction has also been carried out in the gas phase in the past, that the various reaction parameters in the claims would have been arrived at by optimization, and that the results have not been shown to be unexpected.

In reply, since the present invention is drawn to the preparation of **aromatic** diisocyanates, it necessarily follows that the diamine reactant is an aromatic diamine. As Applicants disclose in the specification herein at page 1, line 10ff, the preparation of organic isocyanates from the corresponding amines by phosgenation in the gas phase is generally known and that while the phosgenation of aliphatic amines in the gas phase has been adequately described, the industrial phosgenation of aromatic amines in the gas phase has not yet been realized because of various problems associated therewith, as described. Thus, the description in Ohlinger et al (which is from the same assignee as the presently-claimed invention), that "[d]epending on the nature of the amines, the reaction is carried out either in the gas phase or in the liquid phase ..." (column 1, lines 12-14), relied on by the Examiner, can be understood in its proper context. In other words, the Examiner has cited no prior art in which aromatic diisocyanates are disclosed as being successfully prepared by reacting a phosgene with a corresponding aromatic diamine in the gas phase. In effect, the Examiner has not presented a *prima facie* case of obviousness. Therefore, Applicants have no burden to show unexpected results. Since there is no *prima facie* case to operate in the gas phase, it

would not have been obvious to optimize any of the gas phase conditions, such as temperature, pressure, etc. Whether or not it is well-known that gases mix better than liquids, as found by the Examiner, is irrelevant. Indeed, if better mixing were always a criterion in whether to conduct a reaction in the gas phase or the liquid phase, then according to the Examiner's rationale, all otherwise known reactions conducted in the gas phase would never be patentable. The Examiner has cited no precedent supporting such a rationale.

For all the above reasons, it is respectfully requested that this rejection be REVERSED.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that all rejection be REVERSED.

Respectfully submitted,

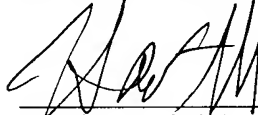
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CLAIMS APPENDIX

Claim 1: A process for preparing an aromatic diisocyanate by reacting a phosgene with a diamine in the gas phase, wherein the reaction is carried out in a reaction zone in which the pressure is more than 3 bar and less than 20 bar and the temperature in the reaction zone is from more than 200°C to less than 600°C.

Claim 2: A process as claimed in claim 1, wherein the temperature in the reaction zone is below the boiling point of said diamine under the pressure conditions prevailing in the reaction zone.

Claim 3: A process as claimed in claim 1, wherein an inert medium is fed into the reaction zone in addition to said diamine and said phosgene in such an amount that the concentration of inert medium at the outlet from the reaction zone is more than 25 mol/m³.

Claim 4: A process as claimed in claim 1, wherein the concentration of said phosgene in the reaction gas at the outlet from the reaction zone is more than 25 mol/m³.

Claim 5: A process as claimed in claim 1, wherein said process is carried out continuously.

Claim 6: A process as claimed in claim 1, wherein said process is carried out in a production plant wherein the phosgene holdup in the reaction zone for the reaction of said diamine with said phosgene in the plant is less than 100 kg.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.